ROUND VALLEY WATER ASSOCIATION (PWS 7190042)
SOURCE WATER ASSESSMENT OPERATOR FINAL REPORT

April 28, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Round Valley Water Association, Idaho, Source Water Assessment Report* describes the public drinking water system (PWS), the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighing system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in another category results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a spring can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic chemical (IOC, e.g. nitrates, arsenic) contaminants, volatile organic chemical (VOC, e.g. petroleum products) contaminants, synthetic organic chemical (SOC, e.g. pesticides) contaminants, and microbial contaminants (e.g. bacteria). As different springs can be subject to various contamination settings, separate scores are given for each type of contaminant.

The Round Valley Water Association drinking water system consists of three ground water well sources. Wells #1 and #2 have a high susceptibility rating to IOCs, VOCs, and SOCs, and a moderate rating to microbial contaminants. Well #3 has a moderate susceptibility to all potential contaminant categories. System construction scores are moderate for each of the wells. Hydrologic sensitivity is high for Wells #1 and #2 due to the lack of a well log. Hydrologic sensitivity is moderate for Well #3. The predominant urban land uses around the wells contributed to the overall susceptibility of the wells.

No VOCs or SOCs have been recorded for the wells during any water chemistry tests. Total coliform bacteria were detected in the distribution system in January 1994, August 1998, and June 2001. However, no coliform bacteria have been detected at the wells. The IOCs chromium, fluoride, and nitrate were detected in the system at levels below the maximum contaminant level (MCL). Sodium has been detected, though no MCL exists for this IOC.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Round Valley Water Association, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Also, disinfection practices should be implemented if microbial contamination continues to be a problem. No chemicals should be stored or applied within the 50-foot radius of the wellheads. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources within the delineation zones. Since much of the designated protection areas are outside the direct jurisdiction of the Round Valley Water Association, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there is a transportation corridor (Highway 93) through the delineations of the wells, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Custer Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR THE ROUND VALLEY WATER ASSOCIATION, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the EPA to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The public drinking water system for the Round Valley Water Association is comprised of three ground water wells that serve approximately 125 people through 39 connections. Situated in Custer County, the wells are located to the east of downtown Challis approximately ½ mile from Highway 93 (Figure 1).

There are no current significant potential water problems affecting the Round Valley Water Association. Total coliform bacteria have been detected in the well distribution system in January 1994, August 1998, and June 2001. However, no coliform bacteria have been detected at either of the wellheads. The IOCs chromium, fluoride, and nitrate were detected in the system at levels below the MCLs. Sodium has been detected, but there is no MCL for this IOC. No VOCs or SOCs have been detected in the wells or the spring during any water chemistry tests.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well or spring that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with Washington Group, International (WGI) to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT zones for water associated with the Round Valley aquifer in the vicinity of the Round Valley Water Association. The computer model used site specific data, assimilated by WGI from a variety of sources including the Round Valley Water Association operator input, local area well logs, and hydrogeologic reports (detailed below).

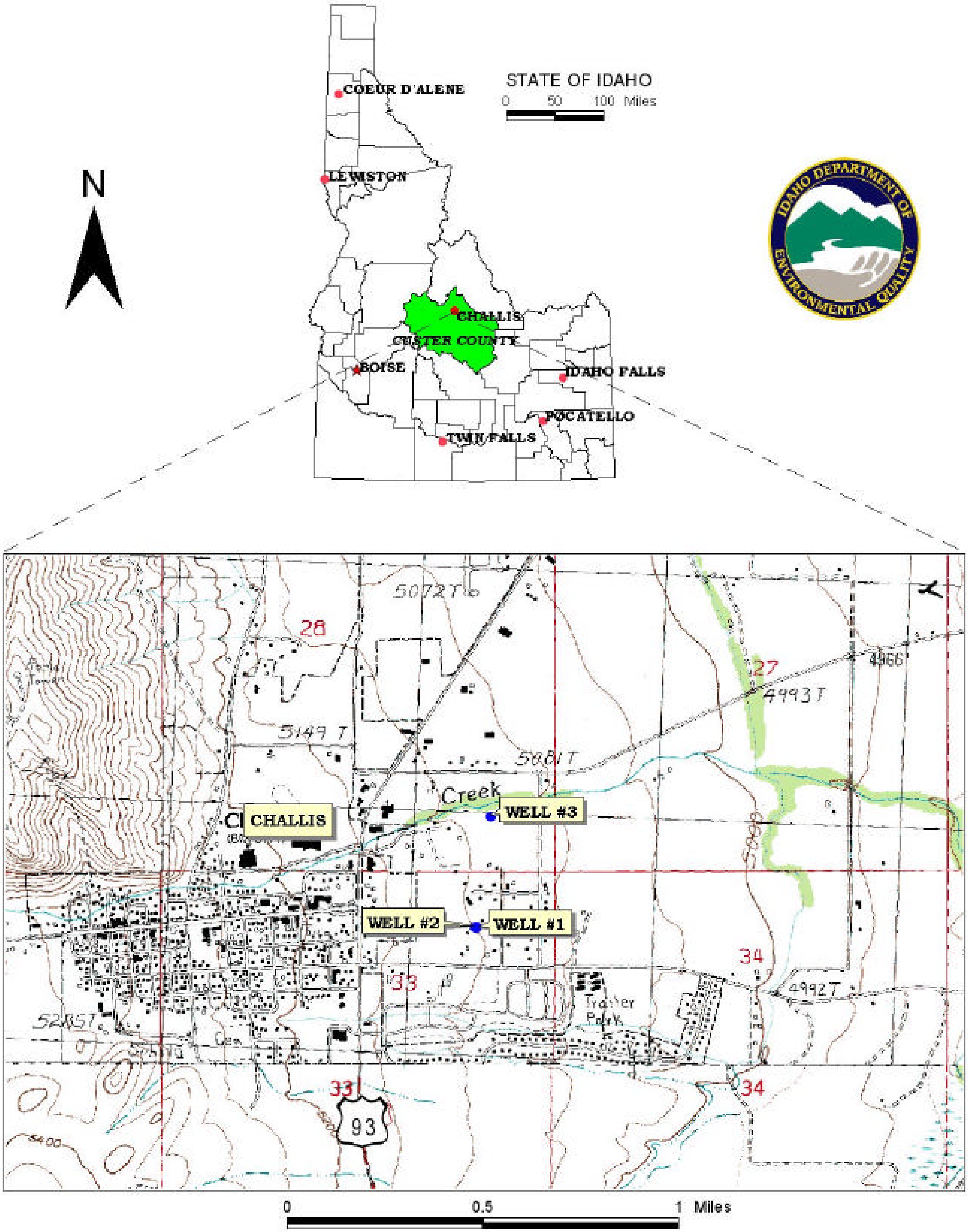
Round Valley Hydrogeologic Conceptual Model

The Round Valley hydrologic province contains two PWSs totaling seven wells located in and around the city of Challis. The average pumping rate ranges from 39,600 to 264,100 gal/day.

The PWS wells are completed in one of two aquifers: a sand and gravel aquifer or a volcanic-rock aquifer. The Round Valley Water Association wells are assumed to be completed in the valley-fill aquifer based on their proximity to the city of Challis E Well #1 and from indications on available well logs.

The Round Valley hydrologic province is a northwest trending basin located between the Lost River Range to the northeast and the Salmon River Mountains to the north and west. The Salmon River enters the province approximately 8 miles southwest of the city of Challis and flows northeast through the basin. The valley fill near Challis is primarily Quaternary aged alluvial fan deposits (Fisher et al., 1983, Plate 1). Interpretation of driller's logs for wells east of Challis indicates the existence of a surficial sand and gravel deposit that has a minimum thickness of 290 feet. West of Challis, only 3 to 43 feet of the sand and gravel deposit are noted before volcanic rock of the Challis Formation is penetrated.

FIGURE 1. Geographic Location of Round Valley Water Association



The valley-fill aquifer is generally unconfined, although artesian conditions do occur. Recharge occurs primarily through precipitation on the surrounding mountains. Seepage losses from surface water bodies and infiltration from irrigation, interaquifer flow, and septic tanks also recharge the aquifer (Parliman, 1982, p. 13). Probable mechanisms of aquifer discharge include seepage to the Salmon River at the lower end of the province and interaquifer flow. Parliman (1982, p. 13) describes the ground-water movement in this and the surrounding provinces as progressing from high to low elevations.

The Round ALVM (alluvium) model was used to delineate capture zones for the three PWS wells located in the alluvial aquifer of the Round Valley hydrologic province. Model boundaries consist of constant-head line sinks representing the Salmon River and the elevation of the water table in the upper end of Garden Creek canyon. Constant-flux line sinks backed by no-flow boundaries were placed on the basin's margin to represent recharge along the bedrock/valley-fill contact.

In the absence of published estimates of areal recharge and evapotranspiration, an areal recharge value of 10 percent of the assumed average annual precipitation on the valley floor (7 inches) was used. Due to the lack of site-specific data, the geometric mean hydraulic conductivity value of 75 ft/day for the Upper Salmon River hydrologic province was selected for simulating the base case aquifer conditions. The effective porosity is 0.3, which is the default value presented in Table F-3 of the Idaho Wellhead Protection Plan for unconsolidated alluvium (IDEQ, 1997, p. F-6). The aquifer thickness is the saturated open interval for the city of Challis E Well #1. The pumping rate for each well is 1.5 times the average, based on the owner/operator response to the WGI questionnaire and the State of Idaho Public Water Supply Inventory Form.

The predicted particle paths intersected Garden Creek after 3 to 4 years of travel. There is no information in the literature regarding surface/ground-water interaction, so to maintain conservatism, the Garden Creek constant-head line sinks were replaced by a single constant-head line sink at the upper end of Garden Creek Canyon. Recharge along the bedrock/valley-fill contact was also added and evaluated over a range of 0 to -2.5 ft^3/day/ft. With these and minor changes to head values along the Salmon River constant-head line sink, the fit with local test well water elevations was enhanced. Areal recharge was also evaluated in the model runs. The initial value of 0.00016 ft/day (0.7 in./yr) resulted in the best fit at test point well locations and was retained in the base case model. The head value in the Garden Creek Canyon line sink was increased in the final run, further enhancing the best fit to the test point data. Model run 7 was selected as the base case based on the sum of squares and root mean squared error criteria.

Due to the proximity of the City of Challis's E Well and the Round Valley Water Association wells in relation to each other and to the bedrock/valley-fill contacts, the pumping of any one of the three wells influences the predicted particle paths of the other two. This result prompted the hybridization of the individual capture zones into a single hybrid capture zone that includes the area of hydraulic capture for all three wells (Figure 2). Assigning the hybrid capture zone to each well provides a flow direction factor of safety to the PWS without requiring rotation or a fixed-distance buffer. The length is slightly more than 5 miles.

The delineated source water assessment areas for the Round Valley Water Association wells can best be described as westward trending corridor nearly five miles long that uses the topographic valley fill boundary of Garden Creek Canyon as the outer boundary of the 10-year TOT (Figure 2). The actual data used by WGI in determining the source water assessment delineation areas are available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and others, such as *cryptosporidium*, and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the Round Valley Water Association wells consists of residential use and other urban uses, while the surrounding area is predominantly rangeland.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted from January through February 2003. The first phase involved identifying and documenting potential contaminant sources within the Round Valley Water Association source water assessment area (Figure 2) through the use of sanitary surveys, computer databases, and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water areas of the wells encompass a westward trending corridor of land. The delineations include Highway 93 in the 3-year, 6-year, and 10-year TOT zones. The highway could contribute contaminants to the aquifer in the event of an accidental spill, release, or flood.

Additionally, according to the 2002 sanitary survey, Well #3 is located within 50 feet of running surface water, though microscopic particulate analysis does not show a connection between the surface water and the producing zone of the well.

FIGURE 2. Round Valley Water Assn. Delineation Map and Potential Contaminant Source Locations

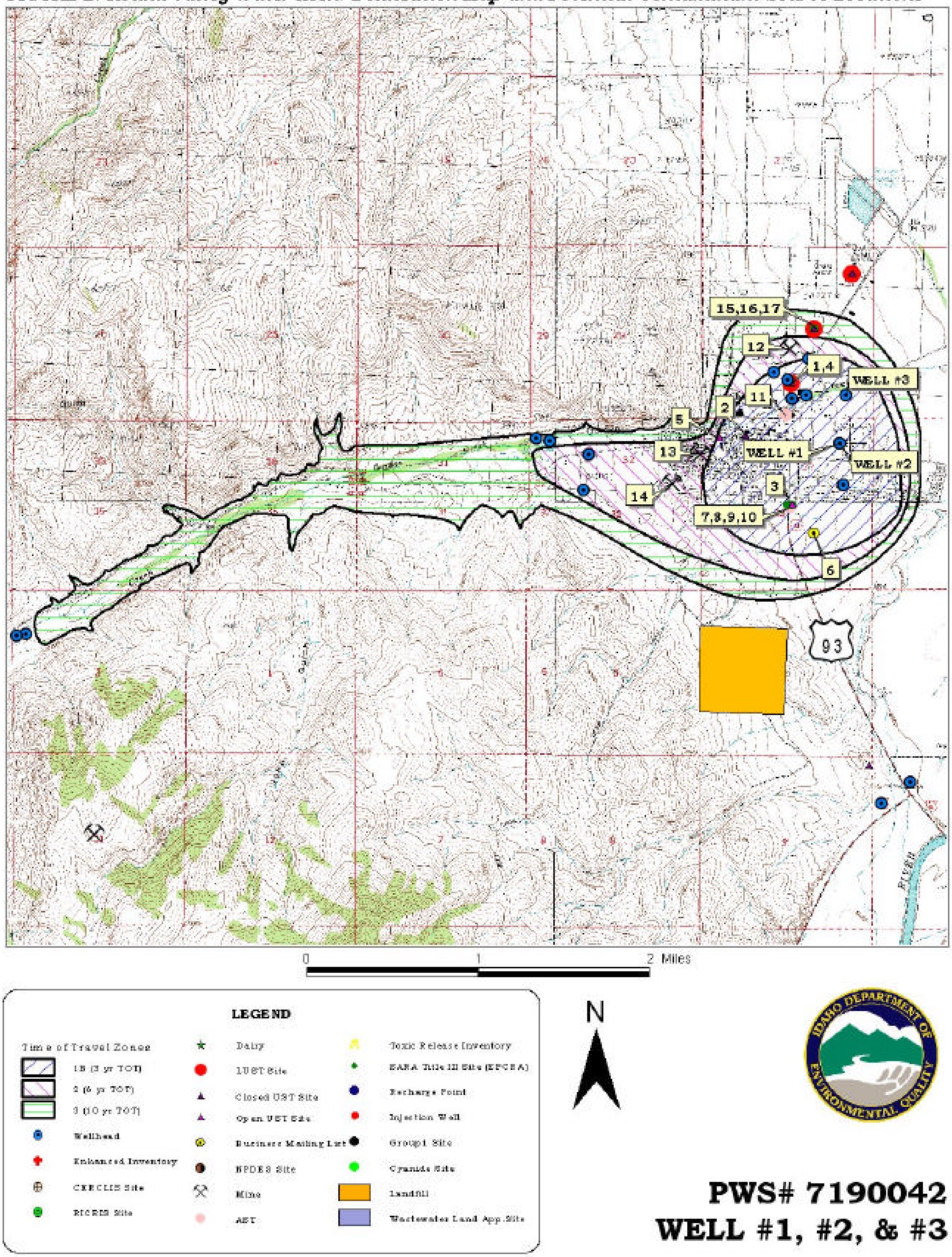


Table 1. Wells #1, #2, and #3 of the Round Valley Water Association, Potential Contaminant Inventory

Site #	Source Description[1]	TOT ZONE[2]	Source of Information	Potential Contaminants[3]
1, 4	LUST Site – cleanup completed, Impact: GROUND WATER; UST site – open	0 – 3	Database Search	IOC, VOC, SOC
2	UST site - closed	0 – 3	Database Search	IOC, VOC
3, 7, 8, 9, 10	UST site – open; petroleum distributor; SARA site; AST site	0 – 3	Database Search	IOC, VOC, SOC
5	UST site – open	0 – 3	Database Search	IOC, VOC, SOC
6	General Contractor	0 – 3	Database Search	IOC, VOC, SOC
11	AST site	0 – 3	Database Search	IOC, VOC, SOC
12	Sand and gravel pit	3 – 6	Database Search	IOC, VOC, SOC
13	Stone mine	3 – 6	Database Search	IOC
14	Mine	3 – 6	Database Search	IOC
15, 16, 17	LUST Site – cleanup completed, Impact: Unknown; UST site – closed; SARA site	6 – 10	Database Search	IOC, VOC, SOC
	Highway 93	0 – 10	GIS Map	IOC, VOC, SOC, Microbes

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. Each of these categories carries the same weight in the final assessment, meaning that a low score in one category coupled with higher scores in the other categories can still lead to an overall susceptibility of high. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity rates high for Well #1 and Well #2 and moderate for Wells #3 (Table 2). The soils surrounding the area of the wellheads are in the moderate to well-drained soil class, which do not adequately reduce the downward movement of contaminants to the aquifer. Lack of a well log for Wells #1 and #2 prevented an assessment of the vadose zone or possible low permeability layers. Operator input put the water table depth at about 190 feet below ground surface (bgs). The well log for Wells #3 show that the vadose zone is a combination of gravel, clay, and sand. Well #3 has cumulative clay layers totaling greater than 50 feet.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The Round Valley Water Association Wells #1 and #2 have high system construction scores, mainly due to a lack of well logs. Well #3 has a moderate system construction score. Well #3 was drilled in 1993 to a depth of 320 feet bgs. The well uses 0.280-inch, 8-inch diameter casing to 280 feet bgs into a "gravel and clay" layer, and 0.250-inch, 6-inch diameter casing from 280 feet to 320 feet bgs into "assorted rock." Perforations were installed from 90 to 100 feet bgs and from 280 to 320 feet bgs. The static water level was recorded as 167 feet bgs. A bentonite annular seal was installed to 20 feet bgs into "boulders, sand, and clay."

According to the 1996 sanitary survey, the wellhead and surface seals are maintained and both wells are properly protected from surface flooding. Lack of the well logs prevented determination of sealing procedures and location of production zones.

Though the wells may have been in compliance with standards when they were completed, current public water system (PWS) well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. These standards include provisions for well screens, pumping tests, and casing thicknesses to name a few. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. A six-inch diameter well requires a casing thickness of at least 0.280-inches and an eight-inch diameter well requires a casing thickness of at least 0.312-inches. As such, the wells were assessed an additional point for system construction.

According to the 2002 Sanitary Survey, Well #3 is the newest well and the primary source. In the summer Well #3 cycles on when the pressure drops to 50 pounds per square inch (psi) and cycles off when it reaches 70 psi. Well #1 cycles on when the pressure drops to 45 psi and cycles off when it reaches 58 psi. Well #2 cycles on when the pressure drops to 35 psi and cycles off when it reaches 55 psi. In the winter Well #2 is disabled and Well #1 is the primary source. It is set to cycle on when the pressure drops to 50 psi and cycle off when it reaches 70 psi. Well #3 cycles on when the pressure drops to 45 psi and cycles off when it reaches 58 psi.

Potential Contaminant Source and Land Use

The wells share the same delineation, and, as such, share the same potential contaminant source and land use scores. The Round Valley Water Association wells rate moderate for IOCs (e.g. nitrates arsenic), high for VOCs (e.g. petroleum products), moderate for SOCs (e.g. pesticides), and low for microbial contaminants (e.g. bacteria). The urban land uses around the wellheads accounts for the largest contribution of points to the potential contaminant inventory rating.

Final Susceptibility Rankings

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a confirmed microbial detection at the wellhead or the spring will automatically give a high susceptibility rating to the well, despite the land use of the area, because a pathway for contamination already exists. Additionally, if there are contaminant sources located within 50 feet of the wellhead or 100 feet of the spring source then the drinking water source will automatically get a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, the Round Valley Water Association Wells #1 and #2 rate high susceptibility to IOCs, VOCs, and SOCs, and rate moderate for microbial contaminants. Well #3 rates moderate for all contaminant categories.

Table 2. Summary of Round Valley Water Association Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	H	M	H	M	L	M	H	H	H	M
Well #2	H	M	H	M	L	M	H	H	H	M
Well #3	M	M	H	M	L	M	M	M	M	M

[1]**H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,**
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

Overall, Wells #1 and #2 of the Round Valley Water Association rate high for IOCs, VOCs, and SOCs, and rate moderate for microbial contaminants. Well #3 rates moderate for all contaminant categories. The urban land use in the 3-year TOT zone of the delineations contributed to the overall susceptibility of both wells.

There are no current significant potential water problems affecting the Round Valley Water Association. Total coliform bacteria have been detected in the well distribution system in January 1994, August 1998, and June 2001. However, no coliform bacteria have been detected at either of the wellheads. The IOCs chromium, fluoride, and nitrate were detected in the system at levels below the MCLs. Sodium has been detected, but there is no MCL for this IOC. No VOCs or SOCs have been detected in the wells or the spring during any water chemistry tests. Well #3 is located within 50 feet of a surface water source, but microscopic particulate analysis shows no connection between the surface water and the producing zone.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Round Valley Water Association, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey. Also, disinfection practices should be implemented if microbial contamination remains a problem. No chemicals should be stored or applied within the 50-foot radius of the wellhead and within 100-foot radius of the spring source. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of farm chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources within the delineation zones. Since much of the designated protection areas are outside the direct jurisdiction of the Round Valley Water Association, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near to urban and residential land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there is a transportation corridor through the delineations, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Custer Soil and Water Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive source water assessment protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Idaho Falls Regional DEQ Office	(208) 528-2650
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, Idaho Rural Water Association, at 1-208-343-7001 or mlharper@idahoruralwater.com for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Donato, M.M., 1998, Surface-Water/Ground-Water Relations in the Lemhi River Basin, East Central Idaho, United States Geological Survey, Water-Resources Investigations Report 98-4185, 20 p.

Fisher, F.S., D.H. McIntyre, and K.M. Johnson, 1983, Geologic Map of the Challis 1x2 Quadrangle, Idaho, United States Department of the Interior Geological Survey, Open-File Report 83-523, 60 p.

Freeze, R.A., and J.A. Cherry, 1979, Groundwater, Prentice-Hall, Inc., 604 p.

Gorelick, S.M., R.A. Freeze, D. Donohue, and J.F. Keely, 1993, Groundwater Contamination: Optimal Capture and Containment, Lewis Publishers, 385 p.

Graham, W.G., and L.J. Campbell, 1981, Groundwater Resources of Idaho, Idaho Department of Water Resources, 100 p.

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Grove, D.B., 1977. The use of Galerkin finite-element methods to solve mass transport equations, Rep. USGS/WRD/WRI-78/011, USGS, Denver, CO, (Available as NTIS PB 277-532 from Natl. Tech. Inf. Serv., Springfield, VA) Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Javandel, I., and C.F. Tsang, 1986, Capture-Zone Type Curves: A Tool for Aquifer Cleanup, Ground Water, vol. 24, no. 5, p. 616-625

Keely, J.F., and C.F. Tsang, 1983, Velocity Plots and Capture Zones of Pumping Centers for Ground-Water Investigations, Ground Water, Vol. 21, No. 6, pp. 701-714.

Kraemer, S.R., H.M. Haitjema, and V.A. Kelson, 2000, Working with WhAEM2000 Source Water Assessment for a Glacial Outwash Well Field, Vincennes, Indiana, U.S. Environmental Protection Agency, Office of Research, EPA/600/R-00/022, 50 p.

Lohman, S.W., 1979, Ground-Water Hydraulics, U.S. Geological Survey Professional Paper 708, United States Government Printing Office, Washington, D.C., 70 p.

Macneal, R.W., 1992, Estimating Aquifer Properties in Analytic Element Models, Proceedings of the 1992 Solving Ground Water Problems with Models, February 11-13, 173-185 p.

Morris, D.A., and A.I. Johnson, 1967. Summary of hydrological and physical properties of rock and soil materials as analyzed by the hydrologic laboratory of the U.S. Geological Survey. USGS Water Supply Paper 1839-D.

Parilman, D.J., 1982, Gound-Water Quality in East-Central Idaho Valleys, U.S. Geological Survey, Open File Report 81-1011.

Rafai, H.S., C.J. Newell, J.R. Gonzales, S. Dendrou, B. Dendrou, L. Kennedy, and J.T. Wilson, 1998, User's Manual for BIOPLUME III - Version 1.0, National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, 282 p.

Spinazola, J., 1998, A Spreadsheet Notebook Method to Calculate Rate and Volume of Stream Depletion by Wells in the Lemhi River Valley Upstream from Lemhi, Idaho, Bureau of Reclamation Pacific Northwest Region, Boise, Idaho, March, 19 p.

Stewart, S. and D. Nelson, 1996, Oregon Wellhead Protection Program Guidance Manual, Department of Environmental Quality and Oregon Health Division, 23 p.

Theis, C.V., 1935, The Relation between Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.

United States Geological Survey, 1995, Trends in Water Use, 1950-1995, http://water.usgs.gov/watuse/pdf1995/pdf/trends.pdf, 5 p.

United States Geological Survey, 2001, http://water.usgs.gov/id/nwis/gwlevels.

Walton, W.C., 1962, Selected Analytical Methods for Well and Aquifer Evaluation, Illinois State Water Survey, Department of Registration and Education, Bulletin 49, 81 p.

Wyoming Department of Environmental Quality, 1997, Wyoming's Wellhead Protection Program Guidance Document, http://www.wrds.uwyo.edu/wrds/deq/whp/whpcover.html.

Young, H.W., and W.A. Harenberg, 1973, A Reconnaissance of the Water Resources in the Pahsimeroi River Basin, Idaho, Idaho Department of Water Administration, Water Information Bulletin No. 31, 57 p.

Washington Group International, Inc, April 2002. Source Area Delineation Report for the Upper Salmon River Basin Hydrologic Province.

Appendix A

Round Valley Water Association Susceptibility Analysis Worksheets

Susceptibility Analysis Formulas

Formula for Well Sources
The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:
0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name : ROUND VALLEY WATER ASSN   Well# : WELL #1
Public Water System Number 7190042   3/13/2003 8:11:40 AM

1. System Construction		SCORE			
Drill Date	1/1/1901				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2002			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A	2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	7	7	6	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	1	6	1	
4 Points Maximum		1	4	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
	Total Potential Contaminant Source / Land Use Score - Zone 1B	9	12	9	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
	Total Potential Contaminant Source / Land Use Score - Zone III	3	3	3	0
Cumulative Potential Contaminant / Land Use Score		19	22	19	4
4. Final Susceptibility Source Score		13	13	13	11
5. Final Well Ranking		High	High	High	Moderate

Ground Water Susceptibility Report   Public Water System Name : ROUND VALLEY WATER ASSN   Well# : WELL #2
Public Water System Number 7190042   3/13/2003 8:15:16 AM

1. System Construction		SCORE			
Drill Date	1/1/1901				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	2002			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		5			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	7	7	6	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	1	4	1	
4 Points Maximum		1	4	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		9	12	9	2
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		18	21	18	4
4. Final Susceptibility Source Score		13	13	13	11
5. Final Well Ranking		High	High	High	Moderate

Ground Water Susceptibility Report | Public Water System Name : ROUND VALLEY WATER ASSN | Well# : WELL #3
Public Water System Number 7190042 | 3/13/2003 8:15:26 AM

1. System Construction

		SCORE
Drill Date	6/22/1993	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	2002
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		3

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		3

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	URBAN/COMMERCIAL	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2

Potential Contaminant / Land Use - ZONE 1B

		IOC	VOC	SOC	Microbial
Contaminant sources present (Number of Sources)	YES	7	7	6	1
(Score = # Sources X 2) 8 Points Maximum		8	8	8	2
Sources of Class II or III leacheable contaminants or	YES	1	6	1	
4 Points Maximum		1	4	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		9	12	9	2

Potential Contaminant / Land Use - ZONE II

		IOC	VOC	SOC	Microbial
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0

Potential Contaminant / Land Use - ZONE III

		IOC	VOC	SOC	Microbial
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1	
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		18	21	18	4

	IOC	VOC	SOC	Microbial
4. Final Susceptibility Source Score	10	10	10	8
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate